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Discovery of *Mythimna lineatipes* (Moore) (Lepidoptera, Noctuidae, Hadeninae) from Japan and Thailand, with a taxonomic study of its close relatives from Asia

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Abstract *Mythimna* (*Mythimna*) *lineatipes* (Moore) is newly recorded from Japan and Thailand. Its close relatives from Asia are studied taxonomically. Lectotype of *M.* (*Mythimna*) *percisa* (Moore) is designated and the female genitalia are illustrated for the first time. Four distinct species, *M.* (*M.*) *lineatipes* (Moore), *M.* (*M.*) *nainica* (Moore), *M.* (*M.*) *percisa* (Moore) and *M.* (*M.*) *lucida* Yoshimatsu and Hreblay are recognized. Keys to species on the basis of male and female genitalia are given.

Key words *Mythimna lineatipes*, Lepidoptera, Noctuidae, new record, Japan, Thailand, Asia.

Introduction

Moore (1881) described *Leucania lineatipes*, *L. nainica* and *L. griseofasciata* from India and later he (1888) also described *Leucania percisa* and *L. irrorata* from India. Of them, however, Hampson (1905) considered *L. lineatipes* and *L. nainica* as valid species treating *L. percisa* as a junior synonym of the former and *L. griseofasciata* and *L. irrorata* as junior synonyms of the latter. Poole (1989) followed Hampson's treatments.

Hacker (1993) recorded *M. lineatipes* and *M. percisa* from the Indian Himalaya region mentioning the existence of a taxonomic problem in this group. Hreblay and Ronkay (1998) reported *M. lineatipes*, *M. nainica* and *M. griseofasciata* from Nepal, and they concluded that *L. irrorata* was a junior synonym of *M. griseofasciata* by the designation and examination of the lectotypes of these two taxa. However, the taxonomic study of this group has been still inadequate. Therefore I have analyzed this group carefully using a lot of specimens from Asia.

An unknown single female of the *Mythimna lineatipes* group from Japan was found in the Sugi collection recently donated to the National Institute for Agro-Environmental Sciences, Tsukuba. This discovery was the starting point of the present paper.

The *Mythimna griseofasciata* species-complex apparently included in a different subgenus from the four species treated in this paper will be revised in a separate paper soon.

Abbreviations used are as follows:

BMNH: The Natural History Museum, London, U. K.,
MNHU: Museum für Naturkunde der Humboldt Universität, Berlin, Germany,
NIAES: Insect Systematics Laboratory, Natural Resources Inventory Center, National Institute for Agro-Environmental Sciences, Tsukuba, Japan,
NIAST: National Institute of Agricultural Science and Technology, Suwon, Korea,

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NSMT: National Science Museum, Tokyo, Japan,
UZM: Universitetets Zoologiske Museum, Copenhagen, Denmark.

Keys to species based on the male genitalia of *M.* (*M.*) *lineatipes* and its close relatives from Asia

1. Cucullus with a small acute process dorsally ····· *M. lucida*
-. Cucullus without processes ····· 2
2. Vesica long, about 3 times as long as aedeagus when everted; the cornutus at the end of vesica blunt and short, nearly 0.5 mm (Fig. 11D) ····· *M. lineatipes*
-. Vesica short, at most 2 times as long as aedeagus when everted; the cornutus at the end of vesica acute and long, nearly 1 mm or more ····· 3
3. Cornuti represented by a long spine at the end of vesica, a bunch of short spines at the middle of vesica and a band of short or long spines continuing from the middle to the distal end; vesica about 2 times as long as aedeagus when everted (Fig. 12) ····· *M. nainica*
-. Cornuti represented by a long spine at the end of vesica and a bunch of long spines over the middle; vesica almost as long as aedeagus when everted (Fig. 13) ····· *M. percisa*

Keys to species based on the female genitalia of *M.* (*M.*) *lineatipes* and its close relatives from Asia

1. Ductus bursae sclerotized entirely and strongly produced posteriorly below antrum ····· *M. lucida*
-. Ductus bursae more or less membranous and not produced below antrum ····· 2
2. Cervix bursae egg-shaped and weakly sclerotized ventrally (Fig. 17) ····· *M. percisa*
-. Cervix bursae tubular and membranous ····· 3
3. Ductus bursae short, the posterior half sclerotized and the anterior half membranous (Fig. 16) ····· *M. nainica*
-. Ductus bursae long and membranous except for the antrum (Fig. 15) ····· *M. lineatipes*

Mythimna* (*Mythimna*) *lineatipes (Moore) [Newly proposed Japanese name: Kuju-kiyotou] (Figs 1–4, 11, 15)

Leucania lineatipes Moore, 1881: 335.
Mythimna (*Mythimna*) *lineatipes*: Kononenko *et al.*, 1998: 317; Hreblay & Ronkay, 1998: 164–165, pl. 147, fig. 21.

Distribution. India, Nepal, Thailand (new record), China, Korea and Japan (new record).

Specimens examined. 1 ♂ (lectotype), Cherra Punji, E. Bengal, Slide BMNH Noct. No. 14330 (coll. BMNH). [Nepal] 1 ♂, Kathmandu, Mt Phulchouki, 2,275 m, 28. iv. 1992, S. Bahadur; 1 ♂, E. Nepal, Sagarmatha, Okhaldhunga 1,800 m, 26. v. 1990, K. Ito (coll. Yoshimoto). [Thailand] 1 ♂, Chiang Mai Prov., Doi Inthanon, Maeo Khun Klang, 1,300 m, 16–17. x. 1983, M. Owada (coll. NSMT); 3 ♂, Chiang Mai Province, Huai Nam Dang, 1,500–1,700 m, 25–27. x. 1984, Karsholt, Lomholdt & Nielsen (coll. UZM). [Korea] 4 ♂ 1 ♀, Suncheon, 15. ix. 1987, J. C. Paik; 1 ♂ 1 ♀, *ditto*, 20. ix. 1987, J. C. Paik; 1 ♂, Yeongcheon, KB, 10. ix. 1991, R. G. O; 1 ♂, Mt Bekun (Kwangyang), JN, 25. vi. 1991, S. B. Ahn; 1 ♀, Jinyang, Gumgok, KN, 20 : 00, 19. ix. 1982, Y. S. Ryu; 1 ♀, *ditto*, 26. ix. 1982, Y. S. Ryu; 1 ♀, Chinjusi, Mt Bibong, KN, 21 : 00, 8. vi. 1984, T. S. Oh (coll. NIAST). [Japan]

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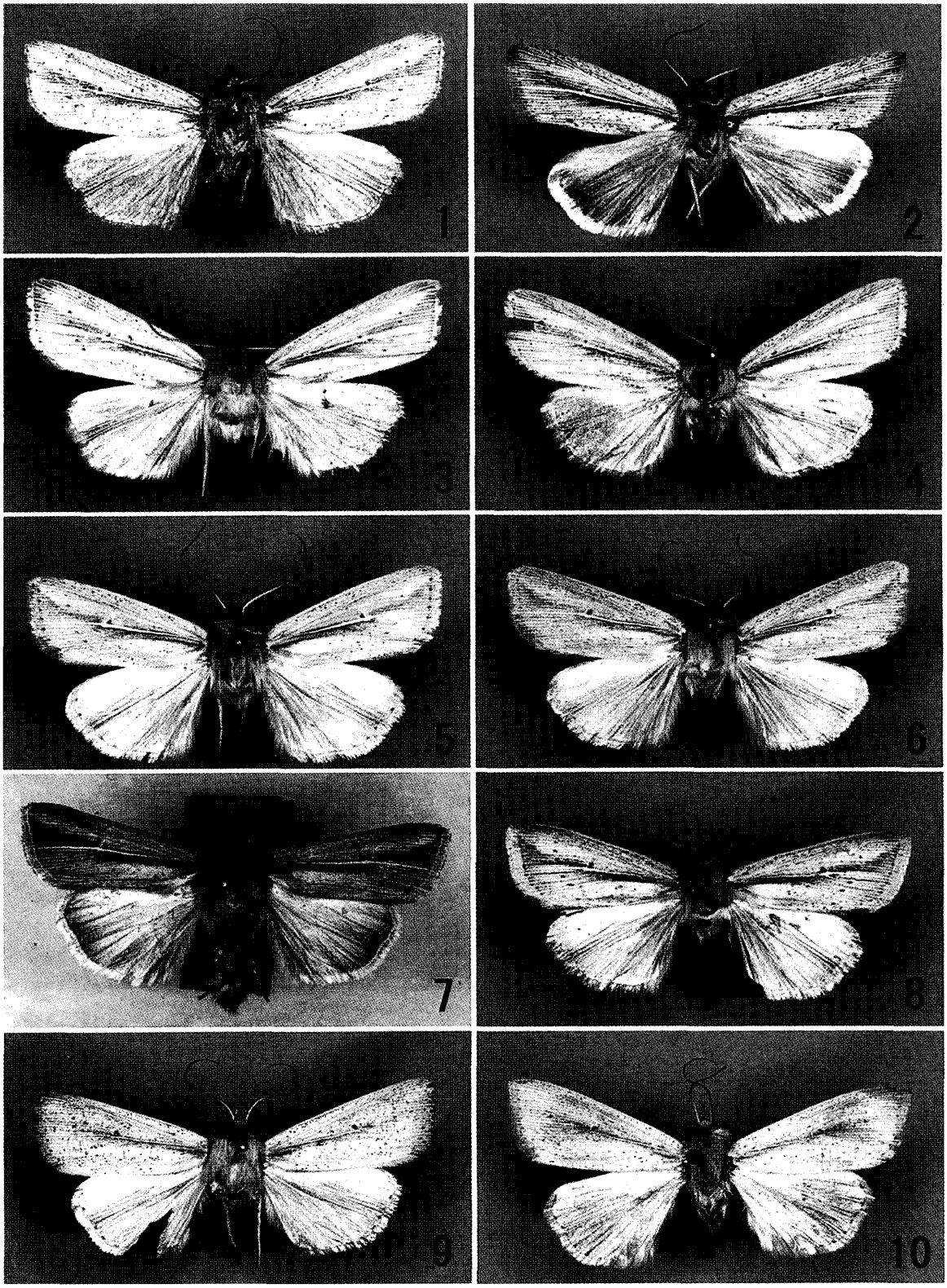

Figs 1–10. Adults of *Mythimna* (*Mythimna*) spp. 1. *M.* (*M.*) *lineatipes* (Moore), ♂ Nepal. 2. *Ditto*, ♂, Thailand. 3. *Ditto*, ♀, Korea. 4. *Ditto*, ♀, Japan. 5. *M.* (*M.*) *nainica* (Moore), ♂, Nepal. 6. *Ditto*, ♀, Nepal. 7. *M.* (*M.*) *percisa* (Moore), lectotype, ♂, India. 8. *Ditto*, ♀, Nepal. 9. *M.* (*M.*) *lucida* Yoshimatsu & Hreblay, holotype, ♂, Taiwan. 10. *Ditto*, paratype, ♀, Taiwan.

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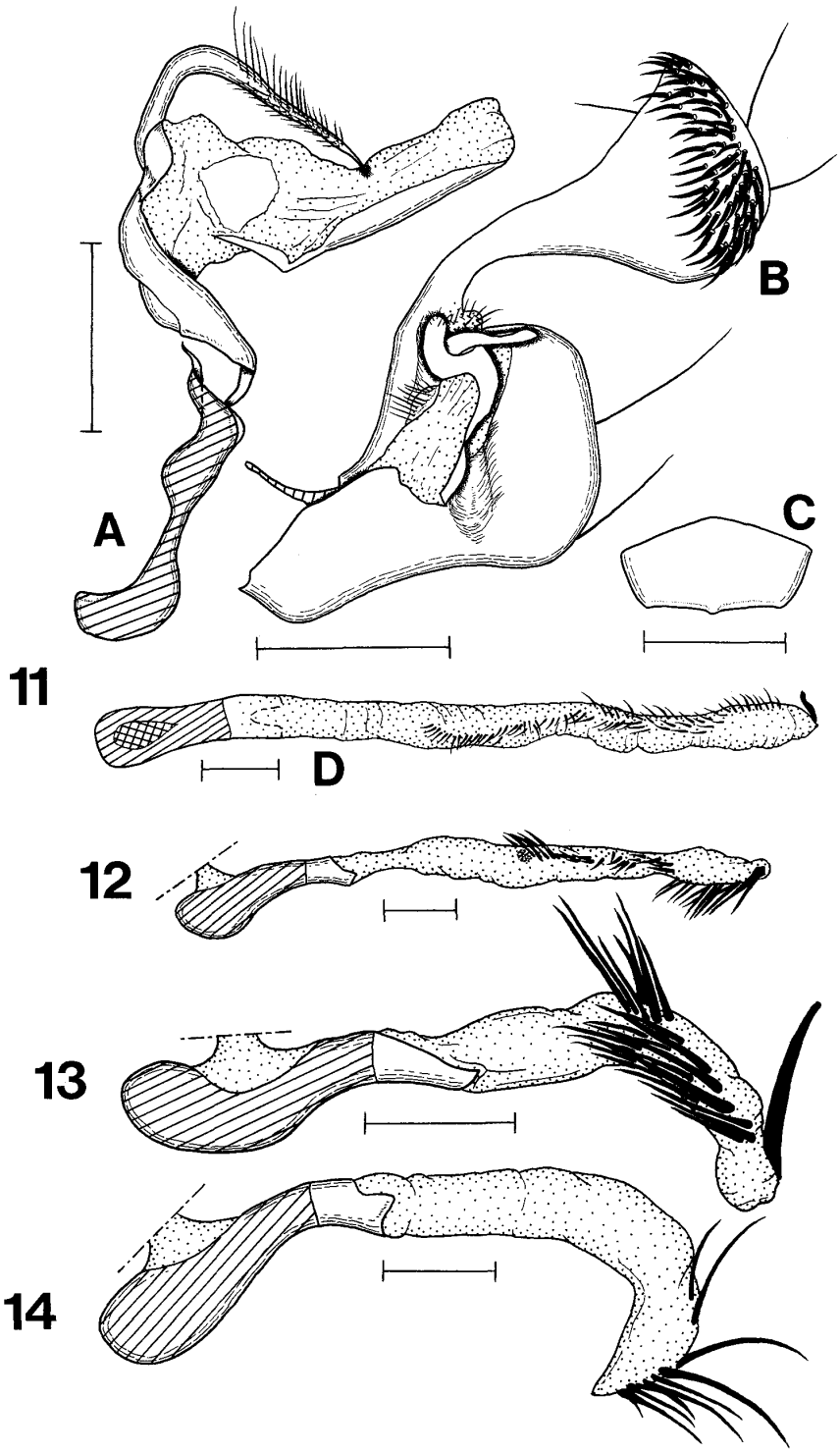

Figs 11–14. Male genitalia of *Mythimna* (*Mythimna*) spp. 11. *M.* (*M.*) *lineatipes* (Moore). A: Ring in lateral view; B: Right valva in inner view; C: Juxta; D: Phallus in dorsal view. 12. Phallus in left lateral view of *M.* (*M.*) *nainica* (Moore). 13. Phallus in left lateral view of *M.* (*M.*) *percisa* (Moore). 14. Phallus in left lateral view of *M.* (*M.*) *lucida* Yoshimatsu & Hreblay. Scales: A, B and D, 1 mm, C, 0.5 mm for Fig. 11; 1 mm for Figs 12–14.

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1 ♀, Mt Kurotake, Oita Pref., 9–10. vi. 1980, A. Miyata, Genitalia Slide No. Miyata 81020209 ♀ (coll. NIAES).

Remarks. On the basis of eleven specimens, Kononenko *et al.* (1998) recorded this species from Korea for the first time. Further data from Korea are given also. Judging from the wide distribution of this species in Korea, probably this species is a resident in Japan though only the single female has been collected until now. Further survey of the distribution of this species in Japan is necessary. For convenience in the future, a Japanese name is newly proposed to this species as described above. Although not illustrated in this paper, *Mythimna* (*Mythimna*) *ensata* Yoshimatsu, 1998, from China are externally very similar to this species group.

Mythimna* (*Mythimna*) *nainica (Moore) (Figs 5, 6, 12, 16)

Leucania nainica Moore, 1881: 337, pl. 37, fig. 15.
Mythimna (*Mythimna*) *nainica*: Hreblay & Ronkay, 1998: 165, pl. 147, fig. 22.

Distribution. India and Nepal.

Specimens examined. [Nepal] 1 ♀, Kharikhola 1,980 m, Solukhumbu, Sagarmatha, E. Nepal, 7. x. 1979, M. Owada; 1 ♀, nr Kathmandu, Mt Siwapuri, Okhureni 2,000 m, 6. x. 1981, M. Owada; 1 ♀, Sundarijal 1,600 m–Pang Sam 1,700 m, 22. v. 1981, S. Asahina (coll. NSMT); 1 ♀, Damang 2,300 m, C. Nepal, 1. vi. 1988 (coll. NIAES); 1 ♂, Godavari 1,600 m, Kathmandu, 20. ix. 1989; 1 ♂, *ditto*, 3. x. 1989; 1 ♂, *ditto*, 28. iii. 1990, Genitalia Slide No. HY-1697; 1 ♂, *ditto*, 24. v. 1992, M. S. Limbu; 1 ♂, Kathmandu, Mt Phulchouki 2,275 m, 21. iv. 1992, S. Bahadur; 1 ♀, *ditto*, 8. v. 1989; 1 ♂, *ditto*, 11. v. 1991; 1 ♀, *ditto*, 26. v. 1990; 1 ♂, Janakpur, Jiri, 1,900 m, 28. iv. 1992, M. S. Limbu; 2 ♂ 1 ♀, Janakpur, Dolakha, Jiri, 2, 350 m, 20–22. iii. 1993, T. Haruta & M. S. Limbu; 2 ♂, *ditto*, 17–19. v. 1993, M. S. Limbu; 1 ♀, *ditto*, 31. v–2. vi. 1993, T. Haruta; 1 ♂, Mechi Taplejung, Hang-Pang 1,305 m, 12–14. iv. 1993, M. S. Limbu (coll. Yoshimoto).

Remarks. Hreblay and Ronkay (1998) mentioned "Unfortunately the abdomen of both syntypes of *M. nainica* Moore are missing, therefore the taxonomical status of *M. nainica* is yet uncertain. The use of the name *M. nainica* is proposed here for the second species, different from *M. lineatipes*", showing the male and female genitalia of both species. As I could find no external differences between these two species, I will follow this treatment at present. And recently through the courtesy of Dr W. Mey of MNHU, I could reconfirm that the two syntypes are indeed without abdomen. One of the syntypes was illustrated by Hacker (1993).

Mythimna* (*Mythimna*) *percisa (Moore) (Figs 7, 8, 13, 17)

Leucania percisa Moore, 1888: 410.

Distribution. India and Nepal.

Lectotype designation. ♂, Dharmsala, Hocking, 87-59, BM Noctuidae Genitalia No. 14331, here designated.

Specimens examined. [Nepal] 2 ♀, W. Nepal, Jumla Dist. Jumla 2,440 m, 19–20. ix. 1981, M. Owada; 1 ♂ 5 ♀, W. Nepal, Karnali, Mugu Dist., Rara Lake 2,990 m, 25–26. ix. 1981, M. Owada (coll. NSMT).

Remarks. Although Moore (1888) gave the type locality as Kangra, this was in error.

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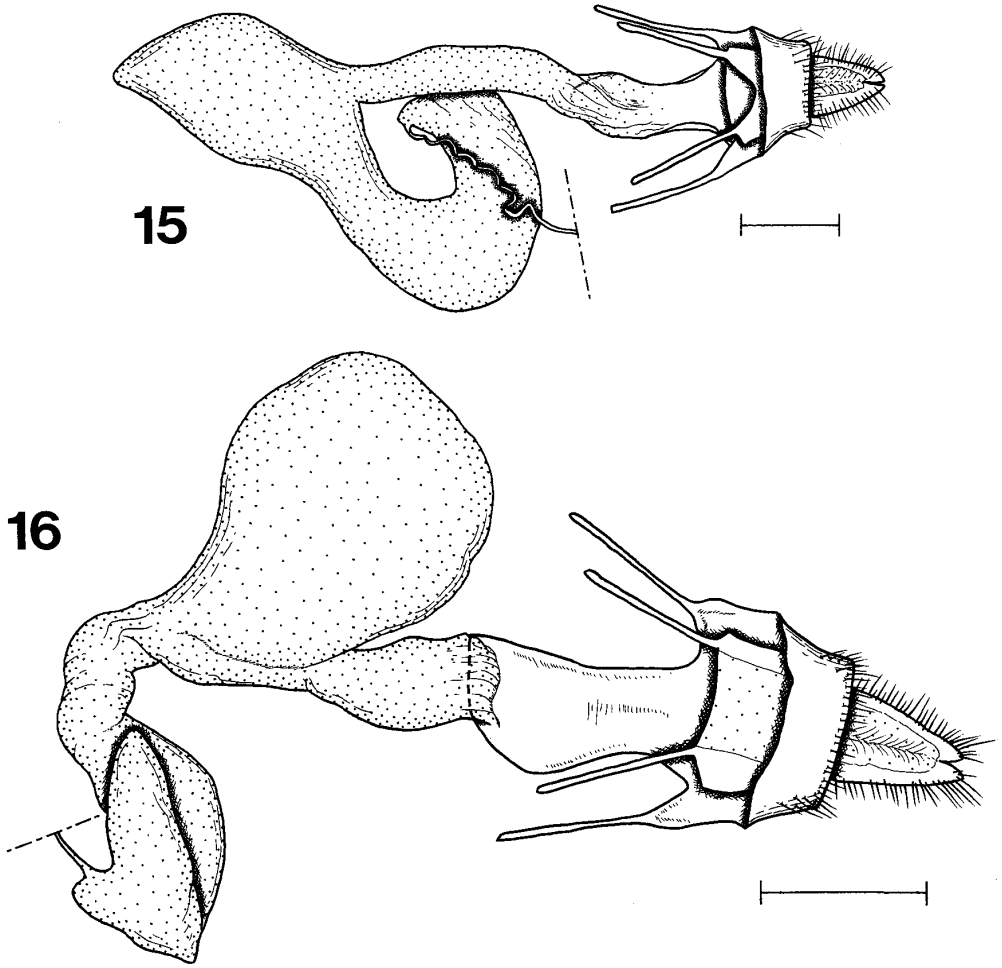

Figs 15–16. Female genitalia of *Mythimna* (*Mythimna*) spp. in dorsal view. 15. *M.* (*M.*) *lineatipes* (Moore). 16. *M.* (*M.*) *nainica* (Moore). Scales 1 mm.

Albert Günther in the 'Preface' to Butler (1889) states "In some instances there are discrepancies between that paper [Moore, 1888] and the present work as regards the localities at which certain species were obtained. The localities are given here on the authority of Mr Hocking, who has been kind enough to look over the proof-sheets". Therefore the correct type locality of *percisa*, as given on p. 51, is "Dharmsala, at sugar in July". Hacker (1993) illustrated the male genitalia of this species from India and Pakistan and considered *M. nainica* to be identical with this species, although the abdomen of the type of *M. nainica* is missing.

Mythimna* (*Mythimna*) *lucida Yoshimatsu & Hreblay (Figs 9, 10, 14)

Mythimna (*Mythimna*) *lucida* Yoshimatsu & Hreblay, 1996: 265–267.

Distribution. Thailand, Vietnam and Taiwan.

Specimens examined. 1 ♂ (holotype), Chun Yang 1,100 m, Nantou Hsien, Taiwan, 25–26. iii. 1981, H. Yoshimoto, Genitalia Slide No. HY-1757 (coll. NIAES). [Taiwan] 2 ♀ (paratypes), Huanshan, nr Lishan, Taichung, 10–12. iii. 1978, T. Tanabe (coll. NIAES). [Vietnam] 1 ♀ (paratype), Maeo Khun Klang 1,300 m, Doi Inthanon, Chiang Mai Prov., 16–17. x. 1983, M. Owada (coll. NSMT).

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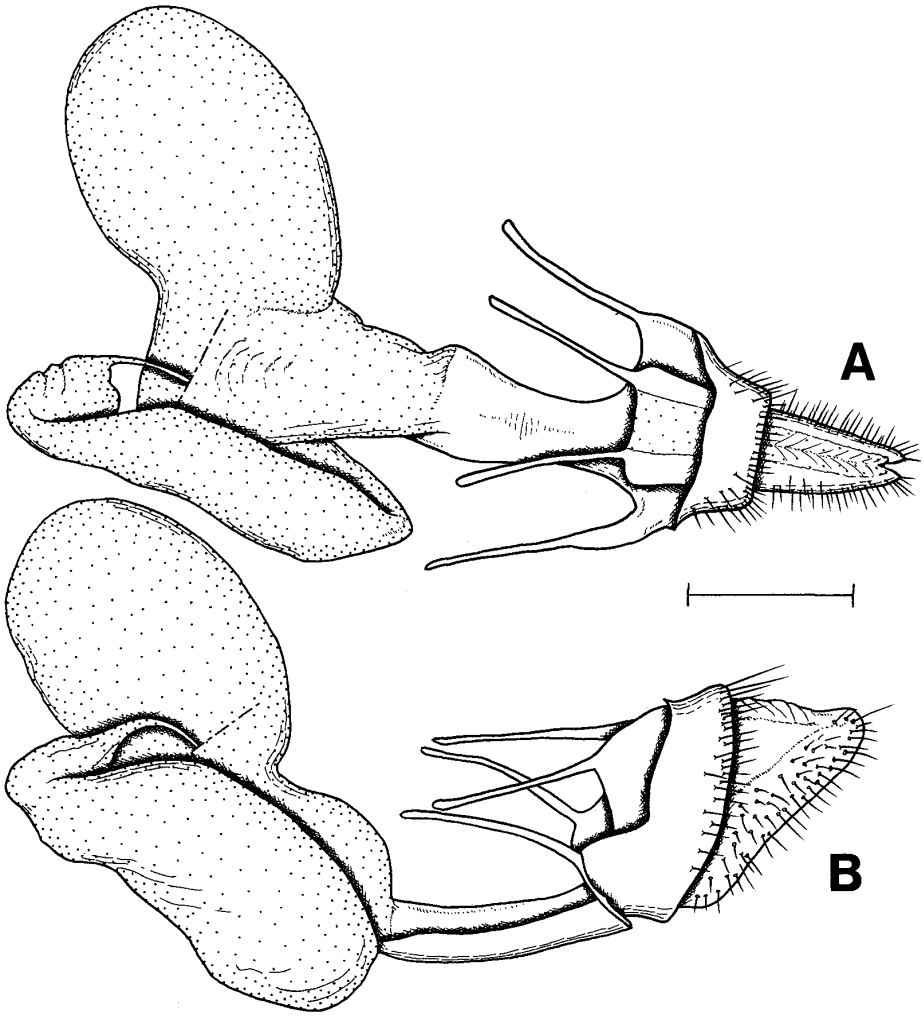

Fig. 17. Female genitalia of *Mythimna* (*Mythimna*) *percisa* (Moore). A: dorsal view; B: left lateral view. Scale 1 mm.

Remarks. The male and female genitalia were illustrated in the original description of this species by Yoshimatu & Hreblay (1996). Yoshimatsu and Legrain (in press) will show the label data of further materials of this species from Taiwan.

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摘　　要

クジュウキヨトウ (新称) *Mythimna lineatipes* (Moore) の日本とタイからの発見とアジア産の近縁種の分類学的整理 (吉松慎一)

筆者の勤務する農業環境技術研究所に最近寄贈された杉繁郎コレクションの中に日本からは記録のないキヨトウの1♀ (Fig. 4) があることに気が付いた．明らかに *Mythimna* (*Mythimna*) *lineatipes* (Moore) グループに属すると思われたが，アジア産の本グループはこれまで分類学的に十分検討されていなかった．

そこで先ず，関連のタイプ標本を全て再調査した．また手元の本グループの標本約50個体を全て解剖し，雌雄交尾器を詳細に比較・検討したところ，アジアには *Mythimna* (*Mythimna*) *lineatipes* (Moore), *M.* (*M.*) *nainica* (Moore), *M.* (*M.*) *percisa* (Moore), *M.* (*M.*) *lucida* Yoshimatsu & Hreblay の4種が確認できた．これら4種成虫は外見的に酷似しており，識別が難しいので，雌雄交尾器を図示するとともに雌雄交尾器に基づく検索表を作成した．

杉コレクションの1♀ (大分医科大学の宮田彬氏が大分県の九重山群の一角にある黒岳で1980年6月に採集) (Fig. 4) は，このうち *M.* (*M.*) *lineatipes* (Moore) に一致したので，今回クジュウキヨトウと新たな和名を付けた．本種の雌交尾器は ductus bursae が長く，antrum の部分を除けば膜質で，cervix　bursae は管状で膜質であり，corpus　bursae の左後方に付着していることで他種とは区別できる (Fig. 15)．一方，4種の雄交尾器での識別は vesica の cornuti の形態を観察することで容易である (Figs 11D, 12–14)．また，本種を今回タイからも初めて記録した．4種の中ではクジュウキヨトウはインドから韓国，日本にまでかけて最も広く分布している．日本からのさらなる採集記録が期待される．

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